

**RTCA Special Committee 186 Working Group 6**

**ADS-B / ASA MASPS Maintenance**

**Meeting #26**

**Teleconference and WebEx Session**

**9:00am – 11:00am EDT**

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**Proposed ADS-B Ground Receive System Descriptions for  
Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance  
(ADS-B-RAD),**

**ADS-B Non-Radar-Airspace (NRA) Application (ADS-B-NRA),**

**ADS-B Airport Surface Surveillance Application (ADS-B-APT),**

**and**

**Table 2-10 ADS-B Out Applications - Minimum Performance Requirements, be updated to reflect  
ADS-B-APT**

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**SUMMARY**

This Working Paper provides 2 updates to the proposed ADS-B combined MASPS. First, this paper provides a proposed description of ADS-B-RAD, ADS-B-NRA, and ADS-B-APT. Second, this paper proposes Table 2-10 ADS-B Out Applications - Minimum Performance Requirements, be updated by adding a column for ADS-B-APT.

## 1. INTRODUCTION

The revised version of the ADS-B MASPS requires a high level description of ADS-B-RAD, ADS-BNRA, ADS-B-APT ~~and GIM~~. This working paper provides a high level description of these systems and proposes the descriptions provided be used in the new MASPS in paragraph 3.2.2.1.

## 2. PROPOSED TEXT CHANGE TO PARAGRAPH 3.2.2.1

This paper proposes paragraph 3.2.2.1 be rewritten as follows:

### 3.2.2.1 ADS-B (Ground Receive) (RAD, NRA, APT, ~~GIM-S~~)

#### 3.2.2.1.1 Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance (ADS-B-RAD)

The ADS-B-RAD application will support, and in some cases enhance, Air Traffic Services through the addition of ADS-B surveillance in areas where radar surveillance exists. It will apply to the En Route and terminal airspace in classes A to D. The application is designed to support the following ICAO Air Traffic Services:

1. Air Traffic Control Service, including
  - a. Area Control Service
  - b. Approach Control Service
2. Flight Information Service;
3. Alerting Service;
4. Air Traffic Advisory Service.

The introduction of ADS-B may enhance these services by improving the overall quality of surveillance, i.e., radar plus ADS-B such that an operational benefit may include a reduction in the applied separation standards from that applied in today's airspace but not below the ICAO minima, e.g., 10 NM to 5 NM.

Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance is discussed in more detail in RTCA DO-318, Safety, Performance and Interoperability Requirements Document for Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance (ADS-B-RAD).

#### 3.2.2.1.2 ADS-B Non-Radar-Airspace (NRA) Application (ADS-B-NRA)

The ADS-B-NRA application is designed to support and enhance Air Traffic Services in both En- route and Terminal Maneuvering Area (TMA) airspaces in non-radar areas.

The ADS-B-NRA application will provide enhanced Air Traffic Services in areas where radar surveillance currently does not exist.

The ADS-B-NRA application will be most beneficial in areas where, the level of traffic, location, or the cost of the equipment, cannot justify the installation of a radar. Examples of such areas include remote locations, off-shore oil rigs and small island environments. ADS-B-NRA

may also be used in areas where an existing radar is to be de-commissioned and the replacement costs cannot be justified.

The ADS-B-NRA application is designed to enhance the following ICAO Air Traffic and Flight Information Services:

- Operation of air traffic control service
- Separation minima
- Transfer of responsibility for control
- Air traffic control clearances
- Scope of flight information service
- Alerting Service, principally for the following functions: Notification of rescue co-ordination centers
- Plotting of aircraft in a state of emergency
- Air Traffic Advisory Services

ADS-B-NRA will provide benefits to capacity and enhancements to these services, when compared to current capabilities, in a way similar to the introduction of SSR radar. This will be especially true when and where many aircraft become ADS-B equipped.

It is expected that this application will provide, efficiency and safety in a similar way as could be achieved by the introduction of SSR radar.

ADS-B-NRA will enhance the Air Traffic Control Service by providing controllers with improved situational awareness of aircraft positions and the possibility of applying separation minima much smaller than what is presently used with current procedures. The Alerting Service will be enhanced by more accurate information on the latest position of aircraft. Furthermore, the broadcast of ADS-B emergency status information will be displayed to the controller independently from any radio communications.

The intention of the ADS-B-NRA application is to allow the procedures using radar surveillance to be enabled by ADS-B, assuming that the quality of service of ADS-B surveillance is similar to (or better than) SSR radar and that appropriate air-ground communications coverage is available.

While the role of the controller and pilot will remain unchanged, there may be impact on their workloads because of new control procedures and the provision of enhanced services. Flight crews may interface with the ADS-B transmitter in a way similar to that of a SSR transponder.

ADS-B-NRA is discussed in more detail in RTCA DO-303, Safety, Performance and Interoperability Requirements Document for the ADS-B Non-Radar-Airspace (NRA) Application

### **3.2.2.1.3 ADS-B Airport Surface Surveillance Application (ADS-B-APT)**

The ADS-B-APT application aims to enhance aerodrome operations by adding ADS-B surveillance to a non-surveilled aerodrome and provide the controller with an appropriate graphical display to view the surveillance data.

The ADS-B-APT application will provide the controller with a display of the airport layout (showing as a minimum runway and taxiway boundaries) and the positions of the aircraft and

ground vehicles on the Maneuvering Area, along with the surveillance data associated with these vehicles.

ADS-B-NRA surveillance data is intended to augment the controller's situational awareness and help manage the traffic in a more efficient way. The ADS-B-APT application will support the controller in performing the Aerodrome Control Service tasks, for example to assist in the detection of runway incursions. In this respect, the application does not aim to reduce the occurrence of runway incursions, but may reduce the occurrence of runway collisions by assisting in the detection of the incursions.

Controllers use radio communications and out the window scans, as well as manual aide-memoires to obtain and maintain traffic situational awareness in support of the Aerodrome Control Service. As visual observation is the primary source of aircraft and ground vehicle situation awareness, ADS-B-APT is expected to bring its greatest benefits in poor visibility conditions, when visual observation may become difficult and the controller becomes more reliant on voice and other aids.

The most similar existing environment to the ADS-B-APT environment is an environment with a Surface Movement Radar (SMR) in that both are designed as an augmentation to Aerodrome Procedures and not designed to be used on their own (such as for A-SMGCS).

In the Target Environment, all existing procedures for flight crews and controllers used for Aerodrome Operations remain valid and unchanged when compared to the Reference Environment, except transponder procedures which will be required to be applied before entering the Maneuvering Area. Flight crew and controller roles and responsibilities are also unchanged by the introduction of ADS-B-APT. Further, the design of the airport is unchanged with the introduction of ADS-B-APT.

Some data items that ADS-B provides (e.g. identification) are not available in the SMR environment. In this regard, guidance is provided on identification procedures, though there are no new procedures relating to the identification of aircraft or ground vehicles. The controller may correlate the callsign with the Mode A code or use direct recognition of the vehicle's Identity Information in the ADS-B label.

The Target Environment is assumed to be a simple to complex aerodrome layout with many taxiways, possibly multiple terminals and aprons and possibly multiple runways, but limited up to two active runways at a time, with ADS- B as a unique means of surveillance. 100% ADS-B OUT qualified equipage for the aircraft or ground vehicles in the Maneuvering Area is assumed.

The ADS-B-APT application is not designed to assist in the detection of Intruders, as they are not authorized and/or not equipped.

ADS-B-APT is discussed in more detail in RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B Airport Surface Surveillance Application (ADS-B-APT).

**3. PROPOSED CHANGE TO TABLE 2-10 ADS-B OUT APPLICATIONS - MINIMUM PERFORMANCE REQUIREMENTS**

This paper proposes Table 2-10 have a column added (note text in blue and bold) to include ADS-B-APT as follows

	NRA - 3 NM EnRoute	NRA - 5 NM EnRoute	RAD - 5 NM EnRoute	RAD - 3 NM Terminal	RAD - 2.5 NM Approach	RAD - 2.0 NM Approach	RAD - Independent Parallel Approach	<b>APT</b>
	DO-303	DO-303	DO-318	DO-318	DO-318	DO-318	DO-318	<b>DO-321</b>
NACp	6	5	7	8	8	8	8	<b>=8 for V2 =6 for V0</b>
NACv	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Vertical Accuracy, 95%	38.1m / 125 ft	38.1m / 125 ft	38.1m / 125 ft	38.1m / 125 ft				
SIL	2	2	3	3	3	3	3	<b>=3 for V2 =2 for V1</b>
NIC	5	4	5	6	7	7	7	<b>0</b>
SDA	2	2	2	2	2	2	2	<b>≥ 1</b>

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